

# REPORT DOCUMENTATION PAGE

1. REPORT DATE (dd-mm-yy)		2. REPORT TYPE		3. DATES COVERED (from... to) Final Mar 98 - Sep 98	
4. TITLE AND SUBTITLE You Asked, We Listened: A Software Tool for Predicting Live-Fire Scores from Device-Based Scores				5a. CONTRACT OR GRANT NUMBER	
				5b. PROGRAM ELEMENT NUMBER 633007	
				5c. PROJECT NUMBER A792	
				5d. TASK NUMBER 2125	
6. AUTHOR(S) Joseph D. Hagman				5e. WORK UNIT NUMBER H01	
				8. PERFORMING ORGANIZATION REPORT NUMBER	
				10. MONITOR ACRONYM ARI	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) U.S. Army Research Institute for the Behavioral and Social Sciences ATTN: TAPC-ARI-ID 5001 Eisenhower Avenue Alexandria, VA 22333-5600				11. MONITOR REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES) U.S. Army Research Institute for the Behavioral and Social Sciences 5001 Eisenhower Avenue Alexandria, VA 22333-5600					
12. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release; distribution is unlimited.					
13. SUPPLEMENTARY NOTES					
14. ABSTRACT (Maximum 200 words):  This article describes a Windows 3.x/95-based software program developed to enable U.S. Army Reserve Component unit trainers to predict performance on any soldier/crew live-fire evaluation exercise that is simulated on a training device, provided the same scoring procedure is applied to each. Once the device and live-fire scores are entered by the user, the program automatically calculates the predictions and then saves them in tabular format.					
15. SUBJECT TERMS Reserve Component      Performance Prediction      Training Devices					
16. REPORT Unclassified			17. ABSTRACT Unclassified		18. THIS PAGE Unclassified
19. LIMITATION OF ABSTRACT Unclassified			20. NUMBER OF PAGES 3		21. RESPONSIBLE PERSON (Name and Telephone Number) Joseph D. Hagman 208-334-9390

19990108 014



Download this software from the ARI Website,  
www.ari.army.mil, click on "New Products"

## U.S. Army Research Institute - Reserve Component Training Research Unit

# You Asked, We Listened: A Software Tool for Predicting Live-Fire Scores from Device-Based Scores

by Dr. Joseph D. Hagman

Back in the 1996 November-December issue of *ARMOR*,<sup>1</sup> Dr. John Morrison and I proposed a strategy that would permit Army National Guard (ARNG) armor unit trainers to complete the device-based portion of their tank gunnery training program in just three Inactive Duty Training (IDT) weekends and afterwards be able to predict which of their crews would be first-run qualifiers on Tank Table VIII (TTVIII). What made this strategy tick was a table that predicted TTVIII gunnery scores on the basis of gunnery scores fired on the Conduct-of-Fire Trainer (COFT).

Since appearance of this article, we've received telephone calls and e-mail messages from ARNG armor unit trainers wanting to know if they could develop their own prediction tables that would extend to other devices (e.g., the Armor Full-Crew Interactive Simulation Trainer [AFIST]) and perhaps better apply to their specific TTVIII range(s). Not only is the answer to this question yes, but the U.S. Army Research Institute's field office in Boise, Idaho, has gone ahead and developed a software tool to support this desired capability.

### The Tool

The tool is a floppy-disc-based software program designed to run in a Windows 3.1 or 95 environment. It can calculate predictions for any live-fire evaluation exercise (e.g., TTVIII) that is simulated on a training device (e.g., COFT, AFIST), provided the same scoring procedure is applied to each. You enter the device and live-fire scores and, with the click of a button, the tool automatically performs the statistical analyses needed for calculating the predictions and then saves the results of your work.

### How Does It Work

The steps you will need to take to create, view, interpret, and use the tool's predic-

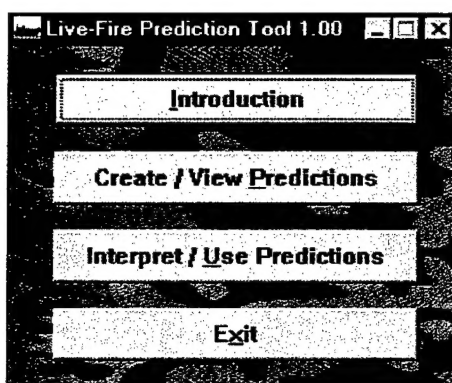


Figure 1. The Prediction Tool main menu

tions are listed under the main menu options shown in Figure 1. You simply click on the desired option to enter, or obtain, the information requested. It's that easy.

Clicking on the "Introduction" button provides you with (a) guidance on what kind of device and live-fire data will need to be collected and then entered, (b) tips on how these data should be collected for best results, and (c) helpful hints on how to navigate successfully through the program.

Clicking on the "Create/View" button will lead you to the "Prediction Log" screen, shown in Figure 2, where the results of your work will eventually be stored for permanent access.

Clicking on the "Prediction Log" screen's "Enter New Data Set" button takes you to the "Enter Scores" screen, shown in Figure 3, where the device and live-fire data collected earlier are to be entered, along with information needed to identify your data set. This information includes the category of live-fire to be predicted (e.g., tank gunnery), the specific live-fire exercise scores to be predicted (e.g., TTVIII), the training device to be used for prediction (e.g., COFT), the specific device exercise scores from which predictions will be based (e.g., advanced matrix exercise 131), the cutoff score(s) against which predictions will be calculated (e.g., the minimum TTVIII qualification score of 700), the maximum possible live-fire score (e.g., 1,000 on TTVIII), and specific unit/range information.

Once you've entered the requested information, clicking on the "View Predictions" button sets the program into action and presents you with the resulting predictions. They will be displayed in table

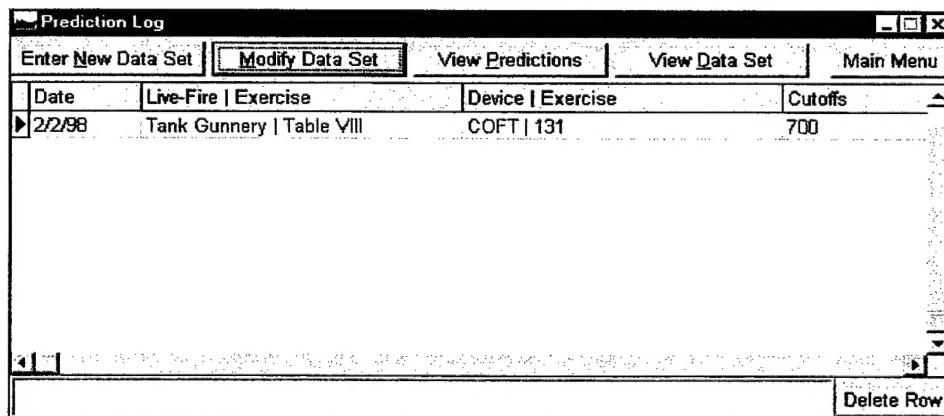


Figure 2. The Prediction Log Screen

**Enter Scores**

View Predictions View Data Set Cancel & Return Save & Return

Date: 02/02/1998 Cutoff 1: 700 2: 3 Max Score: 1000

Live Fire: Tank Gunnery Exercise: Table VIII

Device: COFT Exercise: 131

Range: MPRC Location: Gowen Field, ID

Division: NA Brigade: 116th Cav

Battalion: 2-3 116th Company: A-E

Data Set 58 Rows

Crew / Soldier	Device Score	Live-Fire Score
1	430.00	413
2	512.00	634
3	528.00	455
4	566.00	305
5	572.00	305
6	592.00	439
7	672.00	659
8	674.00	654
9	688.00	677

Insert Row Delete Row

Figure 3. The Enter Scores Screen.

format like that shown in Figure 4. Column 1 will contain a specific range of device scores. Column 2 will show the predicted average live-fire score for each device score listed. Column 3 will show the predicted first-run chances of firing at or above the live-fire cutoff score that you entered earlier (e.g., 700). Lastly, clicking on the main menu's "Interpret/Use Predictions" button will provide you with guidance on how to do just that for the predictions provided. Using the sample prediction table shown in Figure 4, for instance, it would be predicted that a tank crew with a COFT score of 763 will on the average fire 700 on TTVIII and have a 50% chance of successful first-run qualification. A tank crew with a COFT score of 856 will on the average fire 764 and have a 70% chance of successful first-run qualification, and so forth.

### What's the Payoff

The obtained predictions will allow you to do things now that you haven't been able to do before. For starters, you will be able to predict tank crew, first-run, live-fire performance *on your range* based on performance obtained *on your device(s)*. Second, you will be able to schedule device-based training more efficiently by targeting only those crews in need of remediation (i.e., those not meeting the device-based live-fire expectancy standard [e.g., 70% probability of first-run qualification] set by the unit commander). Third, you will know when your crews have received enough device-based training (i.e., when they have met this expectancy standard). And lastly, you will save ammunition by allowing only those crews ready for successful live-fire evaluation to proceed to the range.

Although the prediction tool software program was developed for use by ARNG armor unit trainers to predict the live-fire tank gunnery performance of their tank crews, it's theoretically possible that Active Component (AC) armor unit trainers can benefit from the program's use as well. I say theoretically because we haven't conducted the preliminary research required to assess the validity of its predictions for AC crews. Despite the need for this research, it might be worthwhile to try the program out to see if its predictions also apply to the AC environment. We'd be interested in hearing about the results.

If you have additional questions or comments about the prediction tool soft-

ware program, or if you would like a copy, contact Dr. Joseph D. Hagman, U.S. Army Research Institute, Reserve Component Training Research Unit, 1910 University Drive, Boise, ID 83725; commercial 208-334-9390; fax 208-334-9394; e-mail address: [hagman@ari.army.mil](mailto:hagman@ari.army.mil)

### Notes

<sup>1</sup>Hagman, J. D. & Morrison, J. E., "Research pays off for the Guard: A device-based strategy for training tank gunnery," *ARMOR*, November-December 1996, pp. 48-50.

Dr. Joseph D. Hagman is a senior research psychologist at the U.S. Army Research Institute's field office at Gowen Field, Idaho (208-334-9390). He received a Ph.D. in engineering psychology from New Mexico State University. His research interests are in human learning and memory, and more recently, in soldier performance on armor-related simulation and training devices.

<div> Date: 2/2/98  Range: MPRC  Location: Gowen field, ID  Division: N/A  Brigade: 116th Cav  Battalion: 2-3 116th  Company: A-E </div>		
Predictions of 1st-Run Live-Fire Scores on Tank Gunnery/Table VIII From Device-Based Scores on COFT/Exercise 131		
Device Score	Predicted Average Live-Fire Score	Chances (%) of a Live-Fire Score > 700
541	543	10
616	595	20
674	636	30
721	669	40
765	700	50
809	731	60
856	764	70
914	805	80
989	857	90

Figure 4. Sample Prediction Table.

## **REPRODUCTION QUALITY NOTICE**

**This document is the best quality available. The copy furnished to DTIC contained pages that may have the following quality problems:**

- **Pages smaller or larger than normal.**
- **Pages with background color or light colored printing.**
- **Pages with small type or poor printing; and or**
- **Pages with continuous tone material or color photographs.**

**Due to various output media available these conditions may or may not cause poor legibility in the microfiche or hardcopy output you receive.**



**If this block is checked, the copy furnished to DTIC contained pages with color printing, that when reproduced in Black and White, may change detail of the original copy.**